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THE STORY OF CAST IRON PIPE

By WILLIARD E. PALMER, '29

A GOOD many people neglect to observe the most common, and usually most interesting, scientific processes that are going on about them in the way of manufacturing. One of the most interesting of these is the manufacture of cast iron pipe.

The first step in the manufacturing of pipe is the selection and preparation of materials. The first one of these with which we shall deal is the iron. There are two main kinds used, pig iron and scrap iron. The scrap iron is composed of two parts, these being railroad scrap and No. 1 machinery scrap.

All the pig iron is purchased on specifications covering silicon, sulphur, phosphorus and manganese content. The iron is divided into three classes governed by silicon content. As soon as the car of iron is received in the foundry yards its contents are tested by the shop chemist, thus confirming its silicon content and enabling it to be stacked accordingly. The iron is conveyed from the bins in which it is stacked to a large furnace, called a cupola, where it is placed in alternate layers with coke and limestone, the purpose of the limestone being to purify the iron. The importance of the chemist is again brought out for he tests both the coke and limestone to insure the finest products.

The cupola is fired and the iron is raised to a temperature several hundred degrees over its melting point (1530°C). The cupola is then tapped and the iron drawn off through an opening at the bottom and is run into large bucket like affairs called ladels. At this point we will leave the iron and deal with the other materials, namely the core and the mold.

The core is made by coating an iron bar with "mud." This sounds commonplace enough, but it must be understood this is no ordinary mud, its main constituents being red clay and sand, very carefully mixed. The core bar is placed in stands, where it is rotated by a small electric motor. Rough paper held in with twine is wound around the bar.

The stands which support the core bar also support a board parallel to the bar. The mud is heaped on this board from which position it is easily worked on the surface of the paper. The board is placed at a distance from the core bar which will give exactly the right thickness to the coat of mud.

To get the core the right size and to get it

smooth requires great care. As soon as the coat of mud is applied the core is placed in a coke heated oven to dry, this first process being known to all foundry men as "roughin' 'em up."

As soon as the core is dried it is removed from the ovens and again placed in the stands where it is given a second coat of mud. The mud, this time, is of finer texture and greater care is exercised to get it smooth. The size must also be exact. If the core is too small the pipe will be overweight; if it is too large the pipe will be under weight.

After the core is satisfactorily shaped a coat of blackening is applied. The purpose of this is to make the sand leave the iron, easily. This process is called "striking them up."

After the core comes the preparation of the mould. A pattern, the same size as the outside of the pipe to be made, is placed in a large container called a flask. The flask is stoutly constructed and opens just like a book. Sand is

packed in the space between the pattern and the mould by means of compressed air rammers. When the pattern is lifted out by the crane, there remains a mould the same size and shape as the pipe to be made. The sand used in this work is very carefully prepared. Most of it is lake sand. It must be fine enough to hold together, yet it must be porous enough to allow the escape of gasses when the iron is poured.

The process of setting the cores and pouring the iron comes next. The cores are lifted by a crane and placed in the moulds where they are held in place by circular wedges called sockets, which have holes in them through which the iron runs when poured. Dikes of sand, called "runners," are built around the top of the flask so the iron will not be spilled in pouring.

The iron is poured from the large ladles, mentioned before, the capacity of which is about six tons. Great skill is required in this performance, both on the part of the iron pourer and the crane runner. A slight mistake on the part of either one might ruin the product, or worse yet, might injure the workmen.

As soon as the iron is cooled sufficiently, the core bars are pulled out. The paper, which was wrapped around the bar, has been burned by the terrific heat of the iron, leaving a space which makes the core bar easier to pull out.

The flasks are picked up by a crane and taken to one end of the pit in which they are located.



Traveling Crane in Scrap Yard

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Here the clamps which hold it together are knocked off. The pipes are dropped onto skids, and are then rolled onto a car and wheeled to the cleaning shed.

The cleaning is done as the pipes are **rolled** along skids. The mud, from the core, is cut out of the inside of the pipes and the rough bits of iron are knocked off. The product is then smoothed by the aid of compressed air chisels. After the pipe is thoroughly cleaned it is again heated to a temperature of about 300°C, when it is given a coat of tar. At this temperature the tar enters into the pores of the iron, making it very durable, since the tar will last indefinitely. Cast iron pipe is very durable. Specimens have been dug up recently which were laid in 1855. These same pipes were found in such good condition that they were relaid and are still in use. Cast iron is used a great deal by manufacturing companies for conducting any corrosive substance.

The pipe after being tarred, is given a test of 300 pounds hydrostatic pressure. An inspector is always stationed at this point. No pipe which is not in every way perfect, can pass him. The inspection is, at this time, complete except for weighing, after which the pipe is ready to ship to the consumer. Each step mentioned is going on simultaneously. Thus the cores made one day are used the next. As soon as the pipe is emptied from a flask, that flask is rammed with sand to make the mold for the pipe to be made the next day.